AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Cancelled)

2. (Previously Presented) [The] A [diagnostic] control system [of claim 1, wherein said diagnostic module monitors and compares at least one of the following conditions] comprising:

a controller operable to produce a variable duty cycle control signal for controlling a cooling system device in which said duty cycle is a function of demand for cooling; and

a diagnostic module associated with said controller and operable to compare said duty cycle with a predetermined value indicative of a system condition and issue a signal when said duty cycle bears a predetermined relationship to a fault value;

wherein said diagnostic module monitors at least one of the following conditions:

[said] a valve position of [said] an electronic stepper regulator;

an error value percentage indicative of the percentage of sampled error within an accepted offset range for a defined period of time;

a moving average of said valve position for a defined period of time;

a steady state loading percentage set equal to said moving average of said valve position for a defined period of time when said error value percentage is less than fifty percent;

a discharge cooling fluid temperature;

an evaporator coil inlet temperature;

an evaporator coil exit temperature;

a moving average of a difference between said discharge cooling fluid temperature and said evaporator coil inlet temperature;

a moving average of a difference between said evaporator coil exit temperature and said evaporator coil inlet temperature to approximate a superheat value; and

a length of time said evaporator coil exit temperature is less than said evaporator coil inlet temperature during a predefined period of time.

3. (Previously Presented) The [diagnostic] control system of claim [1] 15, wherein said [diagnostic] module monitors a percentage of sampled error over a defined period of time.

4. (Previously Presented) The [diagnostic] control system of claim 3, wherein said predetermined [fault] value is an accepted offset range.

5. (Previously Presented) The [diagnostic] control system of claim 4, wherein said [diagnostic] module determines an error value percentage indicative of said percentage of sampled error within said accepted offset range for said defined period of time.

6. (Cancelled)

7. (Previously Presented) The [diagnostic] control system of claim [6] 27, wherein said alert module issues an alert signal when [said] a valve position of said electronic stepper regulator valve is approximately zero percent for approximately ninety percent of said defined period of time and said error value percentage is less than one hundred percent, said alert signal indicating said electronic stepper regulator valve is over-sized.

8. (Previously Presented) The [diagnostic] control system of claim [6] 27, wherein said diagnostic module further monitors and compares a superheat value indicative of evaporator superheat.

9. (Previously Presented) The [diagnostic] control system of claim 8, wherein said alert module issues an alert signal when said valve position of said electronic stepper regulator valve is approximately one hundred percent for approximately ninety percent of said defined period of time, said error value percentage is approximately zero percent, and said superheat value is approximately greater than 5° F., said alert signal indicating said electronic stepper regulator valve is undersized.

10. (Previously Presented) The [diagnostic] control system of claim 8, wherein said diagnostic module further monitors and compares an evaporator coil inlet temperature value indicative of evaporator coil inlet temperature.

11. (Previously Presented) The [diagnostic] control system of claim 10, wherein said alert module issues an alert signal when said error value percentage is approximately zero percent, said valve position of said electronic stepper regulator valve is approximately zero percent for approximately one hundred percent of said defined period of time, said evaporator coil inlet temperature value is less than approximately 32° F., and said superheat value is approximately greater than 5° F., said alert signal indicating said electronic stepper regulator valve is stuck open.

12. (Previously Presented) The [diagnostic] control system of claim 10, wherein said error value percentage is approximately zero percent, said valve position of said electronic stepper regulator valve is approximately one hundred percent for approximately one hundred percent of said defined period of time, said evaporator coil inlet temperature value is approximately greater than 32° F., and said superheat value is approximately greater than 5° F., said alert signal indicating said electronic stepper regulator valve is stuck closed.

13. (Previously Presented) The [diagnostic] control system of claim 10, wherein said diagnostic module further monitors and compares an evaporator coil exit temperature value indicative of evaporator coil exit temperature.

14. (Previously Presented) The [diagnostic] control system of claim 13, wherein said alert module issues an alert signal when said valve position of said electronic stepper regulator valve is approximately one hundred percent for approximately one hundred percent of said defined period of time, said error value percentage is approximately zero, said superheat value is approximately less than 5° F., said evaporator coil inlet temperature value is approximately less than 25° F., and said evaporator coil exit temperature value is less than said evaporator coil inlet temperature value for greater than fifty percent of said defined period of time, said alert signal indicating that air flow to an evaporator is blocked or evaporator fans are not operating properly.

15. (Previously Presented) A control system comprising:

a controller operable to produce a variable duty cycle control signal for controlling an electronic stepper regulator valve in which said duty cycle is a function of demand for cooling; and

a module associated with said controller and operable to compare said duty cycle with a predetermined value indicative of a system condition and issue a signal when said duty cycle bears a predetermined relationship to said fault value.

16-21. (Cancelled)

22. (Previously Presented) The control system of claim 15, wherein said module includes a diagnostic module and an alert module.

23. (Previously Presented) The control system of claim 22, wherein said diagnostic module compares said duty cycle with said predetermined value.

24. (Previously Presented) The control system of claim 22, wherein said alert module issues said signal.

25. (Cancelled)

26. (Previously Presented) The control system of claim 15, wherein said signal is an alert signal.

27. (Previously Presented) The control system of claim 5, wherein said module includes a diagnostic module and an alert module, said diagnostic module comparing said duty cycle with said predetermined value, and said alert module issuing said signal, said predetermined value being said fault value and said signal being an alert signal.

28. (Previously Presented) The control system of claim 2, wherein said cooling system device is selected from a group comprising: an expansion device, a fan, a compressor, and a refrigerant control device.

29. (Previously Presented) The control system of claim 28, wherein said expansion device is at least one of an orifice, thermal expansion valve, and electronic expansion valve.

30. (Previously Presented) The control system of claim 28, wherein said refrigerant control device is an evaporator stepper regulator.

31. (Previously Presented) The control system of claim 28, wherein said fan is a variable speed fan.

32. (Previously Presented) The control system of claim 28, wherein said fan is a condenser fan.

33. (Previously Presented) The control system of claim 32, wherein said condenser fan is a variable speed fan.

34. (Previously Presented) The control system of claim 2, wherein said module includes said diagnostic module and an alert module.

35. (Previously Presented) The control system of claim 34, wherein said alert module issues said signal.

36. (Previously Presented) The control system of claim 2, wherein said signal is an alert signal.

37. (Previously Presented) The control system of claim 15, further comprising an expansion device controlled by said variable duty cycle.

38. (Previously Presented) The control system of claim 15, further comprising a fan controlled by said variable duty cycle.

39. (Previously Presented) A control system comprising:

a controller operable to produce a variable duty cycle control signal for controlling a fan in which said duty cycle is a function of demand for cooling; and

a module associated with said controller and operable to compare said duty cycle with a predetermined value indicative of a system condition and issue a signal when said duty cycle bears a predetermined relationship to a fault value.

40. (Previously Presented) The control system of claim 39, further comprising an expansion device controlled by said variable duty cycle.

41. (Previously Presented) The control system of claim 39, wherein said fan is a variable speed fan.

42. (Previously Presented) The control system of claim 41, wherein said fan is a condenser fan.

43. (Previously Presented) The control system of claim 41, wherein said fan is controlled by said variable duty cycle.

44. (Previously Presented) The control system of claim 39, wherein said module includes a diagnostic module and an alert module, said diagnostic module comparing said duty cycle with said predetermined value, and said alert module issuing said signal, said predetermined value being said fault value and said signal being an alert signal.

45. (Previously Presented) The control system of claim 39, wherein said module monitors a percentage of sampled error over a defined period of time.

46. (Previously Presented) The control system of claim 39, wherein said predetermined value is an accepted offset range.

47. (Previously Presented) The control system of claim 46, wherein said module determines an error value percentage indicative of said percentage of sampled error within said accepted offset range for said defined period of time.

48. (Previously Presented) A control system comprising:

a controller operable to produce a variable duty cycle control signal for controlling a compressor in which said duty cycle is a function of demand for cooling; and

a module associated with said controller and operable to compare said duty cycle with a predetermined value indicative of a system condition and issue a signal when said duty cycle bears a predetermined relationship to a fault value.

49. (Previously Presented) The control system of claim 48, further comprising an expansion device controlled by said variable duty cycle.

50. (Cancelled)

51. (Previously Presented) The control system of claim 48, wherein said module includes a diagnostic module and an alert module, said diagnostic module comparing said duty cycle with said predetermined value, and said alert module issuing said signal, said predetermined value being said fault value and said signal being an alert signal.

52. (Previously Presented) The control system of claim 48, wherein said module monitors a percentage of sampled error over a defined period of time.

53. (Previously Presented) The control system of claim 52, wherein said predetermined value is an accepted offset range.

54. (Previously Presented) The control system of claim 53, wherein said module determines an error value percentage indicative of said percentage of sampled error within said accepted offset range for said defined period of time.

55. (Previously Presented) The control system of claim 48, further comprising a variable speed fan controlled by said controller.

56. (Previously Presented) The control system of claim 55, wherein said controller controls said fan based on a current operating duty cycle of said compressor.